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IS 13358-1 (1992): Code of practice for cultivation of aromatic plants, Part 1: Geranium [PCD 18: Natural and Synthetic Fragrance Materials]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS 13358 (Part 1) : 1992

(Reaffirmed 2000)

भारतीय मानक

सुगन्धित पौधों की खेती — रीति संहिता

भाग 1 जिरेनियम

Indian Standard

CULTIVATION OF AROMATIC PLANTS —
CODE OF PRACTICE

PART 1 GERANIUM

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FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Natural and Synthetic Perfumery Materials Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

Natural perfumery materials like essential oils, are known to vary in olfactory and other physico-chemical characteristics depending on different agro-climatic conditions. Working on this premise, the Committee had quite some time back published IS 6774 : 1972 'Classification of essential oil-bearing aromatic plants'. This standard covered information relating to botanical identity, habitat, economic stage of growth, harvesting season and part of the plant used for essential oil production. These factors have long been recognized to govern the quality of the natural essential oils.

Realizing the importance of endemic variations of these factors including fertilizer, irrigation, modern technology and appropriate agronomic practices developed through a process of evaluation trial at recognized cultivation centres for aromatic plants in the country, the Committee decided to amplify these efforts directionally and prepare specific codes for good cultivation practices for individual aromatic plants used for essential oil production. This series of Indian Standards for specific aromatic plants is expected to provide guidance to prospective cultivators, producers and users of the essential oils to obtain the optimum yield of the essential oil of an acceptable quality for the perfumery industry.

The crop of plant of geranium, *Pelargonium graveolens* is largely grown in Kodai and Ooty hills in Tamil Nadu and in Bangalore plains in Karnataka State. It is also found wild in the Nilgiris and Shevaroy Hills in Tamil Nadu.

In the formulation of this code, assistance has been derived from R & D work of Department of Cinchona, Udthagamandalam, Nilgiris.

Indian Standard

CULTIVATION OF AROMATIC PLANTS — CODE OF PRACTICE

PART 1 GERANIUM

1 SCOPE

1.1 This code prescribes cultivation practices for production of plant of geranium, botanically known as *Pelargonium graveolens* L. 'Herit ex. Aiton syn. *Pelargonium roseum* Willdenow, fam. Geraniaceae.

1.2 The requirements and methods of sampling and test for oil of geranium have been prescribed separately in IS 587 : 1988.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	Title
561 : 1978	BHC, (HCH) Dusting powders (<i>fourth revision</i>)
587 : 1988	Oil of geranium (<i>second revision</i>)
1308 : 1984	Aldrin, dusting powders (<i>second revision</i>)
1507 : 1977	Copper oxychloride water dispersible powder concentrates (<i>second revision</i>)
6597 : 1988	Glossary of terms relating to natural and synthetic perfumery materials (<i>first revision</i>)
8708 : 1978	Mancozeb, technical
9360 : 1980	Carbofuran granules, encapsulated
9371 : 1980	Aldicarb granules, encapsulated

3 TERMINOLOGY

For the purpose of this standard, definitions given in IS 6597 : 1988 shall apply.

4 TYPES

4.1 The following two varieties of geranium have been successfully cultivated in India:

- a) Algerian or Tunisian; and
- b) Bourbon or Reunion.

4.1.1 These varieties, introduced originally in Yercaud in South India by French settlers, have acclimatized and the constituents of the oil vary slightly from that obtained in the parent region. The Algerian variety is well suited for the Indian climate and the odour value of the oil obtained from this is preferred to that of the Bourbon variety in perfumery industry.

4.2 A new culture has been recently introduced in India from Egypt. This Egyptian type variety prefers hot and humid conditions and high vegetative growth.

5 CHOICE AND PREPARATION OF LAND FOR CULTIVATION

5.1 The land should preferably have a gentle slope, free from rocks and boulders. It should be north oriented and sheltered from heavy winds. An elevation ranging from 1 250 to 2 700 m has been found to be most suitable for its growth.

5.2 The area should be cleared of the forest under cover and the undergrowth as may be existing and then spread and burnt to make the soil sterile. Land for planting should be well prepared by ploughing and discing. To obtain a firm tilth, 20 kg of BHC (5 percent) (*see* IS 561 : 1978) per hectare should be mixed to protect the plant from oil borne fungus or termites. Paths and drains may be made according to the condition of the terrain.

5.3 In hills contour planting is preferred. Lining of the area and peg marking is done to denote the exact places of planting. A spacing of 100 cm × 60 cm is adopted along the contour. Pits of size 30 cm × 30 cm are made. The rooted plants are spaced at 60 cm × 60 cm to 100 cm × 60 cm depending upon the topography.

6 SUITABLE TIME FOR PLANTATION

The planting is done before pre-monsoon showers after sufficient rains have been received and the soil is quite moist.

7 SOILS

The plant comes up well in porous open and slightly calcareous soil, for example, reddish gravelly soil and black cotton soil. The soil should be well-drained and rich in organic manure that should preferably have a pH 5.5 to 7.5. Water logged soil is detrimental to the plant growth and causes disease and eventual death of the plant.

8 PROPAGATION, PLANTING AND MAINTENANCE

8.1 There is no seed setting in geranium, vegetative propagation is, therefore, the only alternative. The cuttings are first raised in a nursery and then transplanted in the fields. For this purpose 8 to 15 cm long woody terminal cutting with 3 to 4 nodes from healthy, disease-free and well grown geranium plants with developed root systems and a crown of leaves are chosen and planted in raised nursery bed of about 3 m × 1 m under partial shade at a distance of 10 cm × 10 cm. The planting may be done with mossed cuttings intact. While planting from polyethylene bags, the sleeves shall be removed without disturbing the root systems. Shoots which have produced lateral growth should be avoided as they do not root readily. A slant basal cut is made just below a node.

The nursery beds are watered before and immediately after planting and cuttings. Watering is carried out daily, twice during the first 3/4 days and once in a day subsequently. It takes 7 to 10 days at 20-25°C to sprout. A treatment of basal end with IBA, 200 ppm improves sprouting. Bright sun, heavy wind and rain can damage the cuttings very fast, therefore, great care be made to shelter the nursery area against these factors. The root system is well formed within about 30 to 40 days and the cuttings are ready for the field within about 60 days. As much as 95 percent rooting is obtained in nurseries.

Cuttings may also be raised in spagnum moss. The cut ends of the stems are dipped in a 0.3 percent solution of fungicide either benomyl or 2 methoxyethyl mercuric silicate before planting. The planting may be done in balls of moss about 9 to 10 cm diameter and containing a handful of jungle soil inside. The ball is tied with agava fibre to keep it intact. Cuttings are planted in the balls in such a way that at least two nodes are inside the soil. The cutting raised in moss is more suitable for early and late planting since they are able to withstand the vagaries of climate. The cuttings may also

be raised in polyethylene (PE) bags of 13 cm × 10 cm size filled with *Shola* soil and sand in the proportion 3:1. The plant grows well in sub-tropical climate. The maximum yield of the oil is obtained when cuttings are raised in the months of February to May and temperature during growth remains between 15 to 18°C.

8.2 To maintain the full compliments of plants in the field and also a high level of productivity consistent with economy, replacement of casualties is done for a period of two years after the formation of the plantations. Vacancies shall be filled up with well-grown tall and healthy plants so that it may not get suppressed by older plant. Weeding cum hoeing, uprooting and burning of diseased plants are very important facets of maintenance. Three rounds of weeding are essential in a year. Mulching with spent materials from the distillery or leaf materials done before the onset of summer preserves the moisture in the soil. Weeding shall proceed harvesting and may be done with two pronged hoe which provides soil aeration also.

8.3 Pruning of the bushes is also necessary when the bushes show sign of decline which is indicated by its weak and stubby laterals with low yield. The branches are cut back to 7 to 15 cm and such pruning is required in the fourth year and also at the beginning of the monsoon.

9 MANURE AND FERTILIZERS

9.1 Prior to transplanting the cuttings, 10 tonnes of good quality farmyard manure is recommended for land preparation. Depending upon the fertility state of soil 60 to 80 kg nitrogen/per hectare is given in 3 splits, at the time of planting, 6 months and 9 months after when first harvest is taken whereas 60 kg P₂O₅ and 30 kg of K₂O/per hectare are given basally-at land preparation. This crop remains for 5 years in yield and gives 2 to 3 cutting per annum. From second year onward 30 kg of N is usually recommended after each harvest. Zinc sulphate and boron salts at 20 kg and 10 kg have improved yield in Kodai hills.

9.2 Alternately, rock phosphate (30 g) mixed with 200 g of organic manure and aldrin (see IS 1308 : 1984) at the rate of 10 g per hectare may be added to the pits (see 5.2). In the year of planting 100 kg of urea, 70 kg of muriate of potash per hectare should be applied during September-October and in subsequent years 375 kg of manure mixture NPK 30 : 30:40

shall be applied in the form of urea, superphosphate and muriate of potash. The manure shall be incorporated with the soil.

10 IRRIGATION

A moderate rain fall between 1 000 mm to 1 500 mm distributed evenly throughout the year is ideal for its growth. Drought coupled with high temperature seriously affects the plant. Irrigation boosts the growth of the plant but reduces the life period of the plant. The plants are also adversely affected by frost and heavy rains and cloudy days.

11 HARVESTING AND OIL EXTRACTION

Harvesting is done at the beginning of the flowering season, when the lemon like odour has changed to a pronounced rose note. The first harvest of terminal branches and twigs is taken after 8 months of planting and thereafter harvesting is done after 3 to 4 months depending upon the growth and season. The plants put out in the field in May-June are ready for the first harvest in the subsequent January. The tender tips with the leaves constitute the material for harvest. Care should be taken to exclude woody and foreign material at the time of harvest. At every harvest, it is necessary to see that adequate foliage is left in the bush. Stripping of the bushes should be avoided. The plant is kept alive by the leaves present in the lower portion of the bushes. One harvest during that first year and 3 harvest during the subsequent years are ideal for good plant growth and economical good quality of oil yield.

Harvesting should be done in the morning hours and distillation should be done after slight withering. It is preferable to do the distillation by steam using stainless steel florence flask connected to aluminium multitude condensers. It shall be filled up with water before commencement of distillation. The oil is skimmed by stainless steel ladle into glass separating funnels and the water is separated by adding common salt. The oil shall be filtered with dry filter paper. The water from oil must be removed and even the last traces may be removed by treating the oil with anhydrous sodium sulphate and filtering. Rubber and wax should not be allowed to come in contact with oil. The oil may be kept in good quality aluminium or glass containers. Fermentation during stacking of harvested foliage spoils the quality of oil. The average yield of the oil from harvested material is around 0.1 percent.

12 COMMON DISEASES OF THE PLANTS AND THEIR TREATMENT

Mites and other sucking insects are a source of damage to the crop during November to April.

The usual diseases that could affect the plant are:

- Pythium vexans* (soil borne),
- Fusarium spp.* (root rot),
- Cercospora spp.* (leaf spot), and
- Puccinia spp.* (rust).

Wilt of geranium is observed very often on the crop. It is a vascular wilt caused by *Fusarium* species, a soil-borne fungus. In the beginning, only a few plants exhibit the typical wilting and drooping symptom, which soon attains alarming rate if ignored. The wilt outbreak could be minimized by observing the following package of control measures:

- a) At the time of planting fresh cuttings in nursery beds, the cuttings are dipped in 0.03 percent benomyl;
- b) Rooted cuttings are dipped again in 0.03 percent benomyl, just prior to transplanting;
- c) Benomyl 0.03 percent is sprayed to the crop about two weeks before it is harvested. After the harvest, benomyl is sprayed again so that the cut ends are drenched with the fungicide. The spray is repeated once more after another two weeks;
- d) Overwatering increases the incidence of wilt. Minimum irrigation and proper hoeing ensure healthy growth; and
- e) Sharp sickles are used for harvesting so that jerks and pulls are avoided, which can otherwise cause damage to the stem near the ground and pave the way for infection.

The crop is prone to termite attack occasionally. This can be easily controlled by mixing 25 kg/ha of 5 percent BHC or aldrin into the soil and irrigating the area. Perhaps it would be appropriate if 2.6 gms of BHC (5 percent) is also added in polyethylene bags in which cuttings are raised for rootings to check the attack of soil borne fungi and termites.

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During inclement weather and after every harvest, spraying with Mancozeb (*see* IS 8708 : 1978) and copper oxychloride (*see* IS 1507 : 1977) prevents disease infection.

Nematode infection may be controlled by application fenfulfothion or application of aldicarb (*see* IS 9371 : 1980) at 16 kg per hectare is reported to reduce its incidence. Grubs can be controlled by application of

carbofuran (*see* IS 9360 : 1980) at the rate of 1 to 2 g per plant or by actually digging out the grubs and destroying them.

NOTE — Lately, use of DDT for agricultural purposes has been banned by Ministry of Agriculture and Rural Development. In very special circumstances, if the use of DDT for plant protection work is required, the Central Govt/State Govts have to purchase it directly from M/s Hindustan Insecticides Ltd, that too to be used under expert Government supervision only.

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